“Projections” versus “Forecasts”
in Human Population Studies

Dorn, in his recent article about human population growth (1), has credited
our work on the same subject (2, 3) as setting “a record, for the entire class
of forecasts prepared by the use of mathematical functions, for the short
length of time required to demonstrate its reliability.”

According to Dorn, a happy contrast
to this method which he describes as
“the extrapolation of mathematical
curves fitted to the past trend of popu-
lation increase” is the “analytical ap-
proach,” which he assures us by no
means tries to make a forecast [“to
estimate or calculate in advance” (4)],
but gives “merely indications of the
population that would result from the
hypothesized assumptions concerning the
future trend in fertility, mortality, and
migration. However, the projections of
fertility, mortality, and migration usually
are chosen to include what the au-
tors believe will be the range of likely
possibilities. . . .” This he properly
points out is called a “projection” [“to
send forth in one’s mind or imagina-
tion” (4)]. He states that “the most
authoritative projections of the popu-
lation of the world are those made by the
United Nations.”

A comparison of the “most authori-
tative” with the “most unreliable” meth-
ood is given in Table 1, which lists the
United Nations projections (5) made
during the past decade for, as an ex-
ample, the year A.D. 2000, together with
the values computed from Eq. 11 of
our article (2).

From Table 1 it appears that the
“most unreliable” values are just the
asymptotes, at the moment of truth, to
the “most authoritative projections”; we
might mention in passing that the
“most authoritative” projectors changed
their minds in the last decade by roughly
a factor of 2, while the “most unreli-
able” values (from Eq. 11) are almost
independent of the time of their deriva-
tion, as was pointed out in our article
(2).

The question remains as to what
causes the “analytical” method to be so
poor in making even short-range projec-
tions. The answer is suggested by
Dorn, who stresses the point that this
method of dealing with a growth proc-
tess takes into consideration instan-
taneous first derivatives only—fertility, mor-
tality, and migration. However, it is
well known in prediction theory (6)
that consideration of higher derivatives
will diminish the variance in the ex-
pectation values. For instance, we could
not catch a ball in flight if we were
unable to compute at least its trajec-
tory’s second derivative, which happens,
in this case, to be a constant. On the
other hand, computation of higher and
higher derivatives requires more and
more data regarding the process under
consideration, which can, by the blind
ones whose vision of the future is blocked, be obtained only by studying
the past! This simple procedure is, alas,
unacceptable to the “analyticist,” to
whom the past is, for unexplainable
reasons, tabu.

In spite of these disagreements in
method we are in full agreement with
Dorn’s conclusions that “man’s ability
to control his environment” can avert
a population catastrophe “provided he
rapidly develops cultural substitutes for
those harsh but effective governors of
his high reproductive potential,” be-
cause his suggestion is precisely our
thesis. We observed that the growth
phenomenon of the human population
in the past is typical of an open-loop
system that is composed of cooperative
elements following a superadditive
composition rule. An intrinsic instability
of such systems, which manifests itself in
a pathologically rapid growth, can be
avoided by converting the open-loop
system into a closed-loop system. Hence,
we suggested a “population servo,”
which, first of all, has to provide a feed-
back that informs the system of its
present state. Dorn’s paper serves our
purpose admirably.

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Table 1. Low, medium, and high world-population projections (in billions) for A.D. 2000,
made by the U.N. in four different years and derived from Eq. 11 of our article (2): N = 1.78
× 10¹⁹/(2027 − t)¹⁹/₉₉ ± 7 percent.

<table>
<thead>
<tr>
<th>Projection</th>
<th>1950</th>
<th>1957</th>
<th>1958</th>
<th>1959</th>
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<tbody>
<tr>
<td>Low</td>
<td>3.20</td>
<td>5.00</td>
<td>5.70</td>
<td>6.20</td>
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<tr>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>High</td>
<td>6.90</td>
<td>~7.00</td>
<td>7.40</td>
<td></td>
</tr>
</tbody>
</table>

References
4. Webster’s New World Dictionary of the American Language (World Publishing Co.,
5. U.N. Publ. No. 34/SOA/Ser. A/17 (1953); U.N. Pop. Rev. 4 (July 1957); U.N. Population
6. N. Wiener, Extrapolation, Interpolation, and Smoothing of Stationary Time Series (Wiley,
New York, 1950).